1085-35-14 **Lihua Zuo*** (lzuo@math.tamu.edu), lzuo@math.tamu.edu, and **William Rundell** and **Xiang Xu**. *The determination of an unknown boundary condition in a fractional diffusion equation.*

In this paper we consider an inverse boundary problem, in which the unknown boundary function $\frac{\partial u}{\partial \nu} = f(u)$ is to be determined from overposed data in a time-fractional diffusion equation. Based upon the free space fundamental solution, we derive a representation for the solution f as a nonlinear Volterra integral equation of second kind with a weakly singular kernel. Uniqueness and reconstructability by iteration is an immediate result of a priori assumption on f and applying the fixed point theorem. Numerical examples are presented to illustrate the validity and effectiveness of the proposed method. (Received June 15, 2012)